A Network Attached Storage (NAS) supports all data storage for the ensoBox™ including services data and subscriber data.

All Core Node components are connected to 10/100 Mbps auto-sensing Fast Ethernet ports on the
5   Core Node Switch.

Figure 6 depicts the network design for the Core Node.

Access Node

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The Core Node Switch is connected to the Access Node Switch (Cisco Catalyst 2924 Fast Ethernet switch) in the Access Node via four (4) 10/100 Mbps auto-sensing Fast Ethernet circuits. Two (2) of those circuits support the Subscribers VLAN, and the other two (2) circuits support the Management VLAN. One (1) circuit per VLAN is sufficient to support traffic between the Core Node and Access
15   Node, however, a second connection is used for redundancy in the event of a failure to one of the circuits.

The Access Node uses two (2) Remote Access Servers (Cisco AS5300) to support dial up connectivity. Each RAS is configured with either four (4), six (6), or eight (8) PRIs, T1s, or E1s that connect the
20   ensoBox to the Public Switched Telephone Network (PSTN). With two (2) RAS' per ensoBox™, each ensoBox™ supports eight (8), twelve (12), or sixteen (16) PRIs, T1s, or E1s. Each RAS is configured with digital modems that allow subscribers to establish a dial up 56 Kbps connection to the Internet. The number of digital modems is dependant on the number of PRIs, T1s, or E1s that are connected to the RAS. A PRI/T1 can support twenty-four (24) digital modems, and a PRI/E1 can support thirty (30)
25   digital modems. Subscribers are authenticated via the Core Node AAA Servers (RADIUS and LDAP). Services URL resolution to IP addresses is provided by the Core Node DNS servers, while Internet URL resolution is supported by DNS servers at the ensoport.com™ data center.

Routing

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Subscriber data requests are switched from the Access Node Switch to the Core Node Router where they are then routed to the appropriate destination. If the destination is not within the ensoBox™ domain, but instead resides within the Internet, the Core Node Router uses a default route to the Internet for processing. If the request is for ensoServices™ that reside within the Services Node, the
35   Core Node Router routes the request to the Core Node Switch, which in turn sends the request to the Services Node Switch, which then sends the request to the load balancer (Cisco CS-50 Content Smart Switch). The CS-50 determines which server will most efficiently process the request.

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All Access Node components are connected to 10/100 Mbps auto-sensing Fast Ethernet ports on the Access Node Switch.

5   Figure 7 depicts the network diagram of the Access Node.

Services Node

The Core Node Switch is connected to the Services Node Switch (Cisco Catalyst 2924 Fast Ethernet
10   switch) via four (4) 10/100 Mbps auto-sensing Fast Ethernet circuits. Two (2) circuits carry Services VLAN traffic and the other two (2) circuits carry Management VLAN traffic. Two circuits per VLAN provide redundancy in the event of a circuit failure between the Core Node and Services Node.

Services run on six (6) Tatung Model U10/440 Sun Ultra 10 Compatible SPARC Workstations. The
15   Tatung workstations support the ensoServices^{TM} including ensoPortal^{TM}, ensoMail^{TM}, ensoWeb^{TM}, ensoNews^{TM}, ensoChat^{TM}, and anonymous FTP. Services run on all six (6) servers to provide a high service availability solution. The servers are connected to a load balancer (Cisco CS-50 CSS) that intelligently routes server requests to the most efficient server available based on server load and number of concurrent TCP sessions per server.

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All Service Node components (other than the servers) are connected to 10/100 Mbps auto-sensing Fast Ethernet ports on the Services Node Switch.

Figure 8 depicts the network design of the Services Node.

25   **ensoBox^{TM} Components**

Core Node Components

30   The Core Node is comprised of the following components:

Black Box 40871 Terminal Server (Console Server)
Cisco 2621 Router
Cisco Catalyst 2924 XL 10/100 Autosensing Fast Ethernet Switch
35   Network Appliance F720 File Server (Network Attached Storage)
Benchmark DLT7 Autoloader
Tatung Model U10/440 Sun Ultra 10 Compatible SPARC Workstations (3)

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APC Smart-UPS 3000 RM 3U T

Component descriptions can be found in Appendix A.

5   **Core Node Router**

Each router port supports a single network within the ensoBox™ as follows:

Router Port	Network
S0	Default route to the Internet
S1	Inactive
FE 0/0	Services Network
FE 0/1	Core Network
E 1/0	Management Network
E 1/1	Subscribers Network
E 1/2	Subscribers Network
E 1/3	Franchise Network

Table 6. Core Node Router Networks

The router supports a static route to the primary Internet provider in country (i.e. – UUNet or a VSAT connection). The router's default route is the next hop Internet provider's router. The ensoBox™ router is not configured to run any routing protocols (i.e, - RIP, OSPF, BGP-4, etc.) at this time, but may be configured as such in the future.

Core Node Switch

The Core Node switch supports all five (5) ensoBox™ VLANs, including the Management VLAN,
20   Services VLAN, Core VLAN, Franchise VLAN, and Subscribers VLAN.

Through Cisco's Switch Clustering technology, additional switches can easily be added to the ensoBox™ configuration without making significant changes to the current ensoBox™ switches. Switch Clustering technology also allows management of all the ensoBox™ switches through a single switch
25   instead of each switch individually.

Core Node Servers

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